Cardiovascular, pharmacology and chemistry
Committee:
Dr. Kotin, Chairman
Dr. Jacobson
Dr. Wilson

#287

Cf. #6
Activated 10/1/54
Renewed 10/1/55
Cf. #142
Activated 1/1/57
Renewed 1/1/58

TOBACCO INDUSTRY RESEARCH COMMITTEE

150 East Forty Second Street New York 17, N.Y.

Application For Research Grant

Date: August 1, 1960

1. Name of Investigator: Paul D. Saltman, Ph.D.

2. Title: Associate Professor of Biochemistry and Nutrition

3. Institution & Address: School of Medicine, University of Southern California Los Angeles 7, California

4. Project or Subject: The Mechanisms of Photosynthetic Reduction.

5. Detailed Plan of Procedure:

Our primary goal in this research is to elucidate the specific requirements for chemical energy and reducing power necessary to effect the reductive fixation of $C^{14}O_2$ by cell-free tobacco leaf systems in the dark. There is little doubt that ATP and TPNH can be generated by illuminated chloroplasts. However, preliminary experiments in our laboratory have demonstrated that these compounds cannot replace light in a cell-free system capable of carrying out photosynthesis. If we are able to mimic the patterns of the photosynthetic reduction of $C^{14}O_2$ in the dark, we will have a more intimate understanding of the mechanisms for the conversion of light energy to reducing power and chemical energy by higher plants.

During the past year, Dr. Joshi and I have developed a cell-free preparation of tobacco leaves containing broken chloroplasts, mitochondria, microsomes, and soluble cytoplasm which fixes $C^{14}O_2$ in the dark by the identical metabolic pathways as the intact leaf. This preparation when illuminated carries out photosynthetic $C^{14}O_2$ fixation. Chromatographic analysis of the dark system, with the addition of ATP, TPNH, and many other co-factors, reveals the absence of any radioactivity in the carbohydrates, despite several thousand counts per minute in the organic and amino acids. It is our plan to attempt to trap labile or transient intermediates generated in the photo-reduction steps by illuminating the system at low temperatures, turning off the light, adding $C^{14}O_2$, and measuring the radioactivity incorporated into the sugar fraction in the dark. Only in the presence of light-generated reducing power will such events take place. If this procedure is successful, we will attempt the direct isolation of the reducing compounds by various chemical and physical procedures. If this approach meets with negative results, we will concentrate on a program utilizing specific inhibitors and antimetabolites to block the light reactions without affecting the dark pathways and thus learn more of the nature of the light requiring steps.

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Source: https://www.industrydocuments.ucsf.edu/docs/lrpl0000

6. Budget Plan:

Salaries	4,200
Expendable Supplies	1,200
Permanent Equipment	--
Overhead (15%)	870
Other (Travel)	400
Total	$6,670

7. Anticipated Duration of Work: The budget presented above will suffice for our first year's program. If the results warrant extension of our research, we will seek continued support for a longer period.

8. Facilities and Staff Available: We have a well-equipped biochemical laboratory with facilities for the preparation of homogenates, enzymatic isolations, etc. We also have an adequate isotope laboratory and have had extensive experience with chromatography and radioautography.

We have excellent liaison with the plant physiologists at California Institute of Technology, and have their full cooperation in the growing of plants in their greenhouses. Dr. G. V. Joshi is a Visiting Professor from Wilson College, Bombay, India. He has broad experience and several publications in the field of plant metabolism and CO_2 fixation. Dr. P. Saltman has engaged in an active program of research on the pathways of the dark and light fixation of CO_2 by plants for the past seven years. An excellent graduate student, Mr. Robert Gee, has entered the department this summer and is interested in working on this problem. We are a small group, but highly activated. Most of the preliminary methodology is in hand and we are ready to proceed with the major problem.

9. Additional Requirements:

10. Additional Information: As indicated above, the amount requested of the TIRC should be adequate for our first year. We hope our success is such that we can seek renewal for a longer period.

The salary of Dr. Joshi is being paid by the National Research Council. He is spending two years in our laboratory as a Post-doctoral Fellow of that organization.

No other support is available for this project.

Signature _____
Director of Project

_____
Business Officer of Institution

RCH Note: This is an advance working copy. The official copy bearing signatures of applicant and university officer is enroute.

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Source: https://www.industrydocuments.ucsf.edu/docs/lrpl0000